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Management Mangrove Experiences Form Coastal People

P N Indah*, I Radianto, Z Abidin, I T Amir, D U Pribadi

*Faculty of Agriculture University of Pembangunan Nasional "Veteran" East Java
Jl. Raya Rungkut Madya, Gunung Anyar, Surabaya City, East Java, Indonesia

* pawana_ni@upnjatim.ac.id

Abstract. The mangrove area has an important meaning in beach ecosystem, both from ecological and economical aspects. For this, the rehabilitation of mangrove forest is done as one effort that aims to maintain and return the mangrove forest function as one of life system supporters, especially in beach area. The most respondent ages of coast people of Gending, Pajarak, dan Kraksaan districts, Probolinggo Regency are between 30 to 59 years old, i.e. as 86 people or 95.55% indicates that coast people are productive ages so they can be hoped very potential for having role in supporting mangrove ecosystem management of Probolinggo Regency coast. The average respondent educational rates are mostly Elementary School to Senior High School, i.e. as 76 people. Generally, human resources of coast people have relatively good education level. Thereby, it can be hoped to have positive potencies for the role of coast people themselves toward the mangrove ecosystem management support of Probolinggo Regency coast. The average most respondents have family burdens two and three people as six people or 6.67 percent. But, there are still three respondents who have not have family burdens. Generally, more and more members help in respondent's jobs. The mangrove ecosystem management strategy of Probolinggo Regency coast is by involving people role (people and people figures) and governmental supports through the models of mangrove forest management strategy, the model of embankment cultivation management by entering mangrove as input resources of production facilities, and ecotourism management by the purpose of improving people income.

1. Introduction

Mangrove forest is one of unique ecosystems, and very potential natural resources, supporting the life of various flora and fauna of aquatic terrestrial which directly has an important role for continuity of human life from economical, socio-cultural, and environmental aspects. (Ablaza-Balayut E, 1995). Mangrove forest area is a forest that grows in estuary, tidal area or seaside. The unique character of mangrove forest is also caused by the combination of plant features that live on the land and in the sea. Mangrove has prominent rooting system, it is called breathing root, is a method of adaptation toward the land condition that is poor of oxygen or even anaerobic. The mangrove area has an important meaning in beach ecosystem, both from ecological and economical aspects. For this, the rehabilitation of mangrove forest is done as one effort that aims to maintain and return the mangrove forest function as one of life system supporters, especially in beach area. (Shang-ShuShih, et.al., 2015). Environmental stress influences biological assemblages, with species responding to stress by adopting particular life-history strategies (e.g., r vs. K). Coastal lagoons and estuaries are considered naturally stressed and physically controlled systems with frequent environmental disturbances and fluctuations (Ruzaf, et.al., 2013).



The efforts of utilizing mangrove resources need to be harmonized by the efforts of preservation and research, so that the functions of mangrove forest physically, ecologically and socio-economically stay eternal and continuing. Because the location that is situated in the ecosystem that is flanked by land ecosystem and sea ecosystem, so the mangrove forest management as an ecosystem should consider all potencies of natural, human, and artificial resources that are situated in land, sea and coast ecosystems.

Mangrove that consists of several types as Mangrove (*Rhizophora* spp.), Wood Fires (*Avicennia* spp.), *Pedada* (*Sonneratia* spp.) and *Tanjang* (*Bruguiera* spp.) has benefits such as: 1) as natural protection that is strongest and most practical for resisting beach erosion, (2) preparing various forest result such as firewood, 3) having potency as eco-tourism, 4) is a habitat for several wild animals which are threatened extinct (sea/coast animals, mammals, birds), and a haven for migrant birds. Seven species of decapod crabs living in mangrove swamps of Halmahera, Indonesia, were found to forage on pneumatophores of *Sonneratia alba* as well as on the substratum (Wada, K and Dasiy Wowor, 1990). The most of the antioxidant enzymes in roots acted coordinately for effective stress mitigation, while leaf tissues might adopt many other mechanisms for salt tolerance of mangrove plants where antioxidant enzymes played minor role (Hossain et.al., 2017). Mangrove ecosystem of Chakoria Sunderbans have been greatly influenced by man's activities (Quader et.al., 1986). The role of coast people in supporting the success of beach ecosystem development is felt very big, remembering the beach ecosystem area is a livelihood area of most coast people, so the involvement and role of people in supporting and maintaining ecosystem harmony are hoped very much for supporting the continuity of their livelihood life.

The coast area is a field of people livelihood, in which various economical activities can be found, such as aquaculture, catching fish, sea results processing, and the development possibility of mangrove forest coast tourism. The management of coast ecosystem which involves space regulation based on the importance and purposes specifically, begun by mangrove forest development by the purpose of developing the habitat ecosystem for available various biotas. The developing biotas in mangrove forest area are basics of food link for other life organism, which estuary is certainly in food availability for humans. The condition like this should be understood by coast people, remembering that they live and seek food sources from coast area. So, the coast people in the coast area of Probolinggo Regency are very hoped about the role in coast ecosystem development.

The research about The Role of Coast People in Supporting Beach Ecosystem Management of Probolinggo Regency has the purposes such as:

- a. Knowing as far as the role of coast people of Probolinggo Regency in beach ecosystem management.
- b. Knowing whatever constraints which obstruct the role of coast people of Probolinggo Regency in beach ecosystem management.
- c. Finding solution in order to improve the role of coast people in beach ecosystem management of Probolinggo Regency.
- d. Determining the management model of effective beach ecosystem for each coast people group in supporting mangrove forest preservation.

Determining the management model of effective beach ecosystem for each coast people group in supporting people income improvement.

2. Methodology

The research activity time of coast people role in supporting ecosystem environmental management of East Java northern coast are conducted for 6 months (April 2016 to September 2016). Whereas the activity places are conducted in several districts of Probolinggo Regency which is a coast area and has a potency for beach ecosystem management.

- a. This research is a review which scope is focused in cross-sectional in the role of coast people toward the ecosystem management of Probolinggo northern coast.

- b. The population in this research is the coast people which consist of several groups based on their livelihoods (free fish catchers, fish and sea result farmers, and another groups) which are spread in 3 districts of Probolinggo northern coast area (Gending, Pajarak, Kraksaan). In order not to ignore the data accuracies which can represent generally, so the sample id determined by using the method of Multistage Random sampling by still watching the characteristics of coast area, culture, and the livelihood of each society, so all members of coast people have the same chances for taken as respondents. The following respondent total is determined proportionally by using the method of simple random sampling. The mathematical formula from this method according to Emory (1994) is as follows:
- c. The data analysis in this research is besides a quantitative research” also a “qualitative research”, because the conducted approach besides uses quantitative method also uses qualitative method. The qualitative method is conducted for knowing the role of coast people in the efforts of beach ecosystem management. Besides that it is also used the analysis through quantitative method for gaining the stronger justification.

For answering the first purpose, it is done through quantitative approach in this research which is supported by using the analysis of “descriptive statistic”, that is a statistic used for analyzing data by the way of describing or drawing the data which have been collected as they are. The descriptive analysis technique in this case is presenting data through table, graphic, average calculation. So, for measuring the attitudes of coast people is by using Likert scale with the score 1 - 5.

For answering the second purpose, that is using the analysis of “descriptive statistic”, that is the used statistic for analyzing data by using the technique of Likert Scale, that is giving the score 1-5 in each criteria. Whereas, for answering the third purpose, that is using the analysis of double linear regression analysis which can be mathematically formulated as follows (Gurajati, 1988).

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \dots + \beta_n X_n$$

In which:

- Y = The attitudes of coast people in the role of managing ecosystem
- X1 = Household income
- X2 = The types of livelihood
- X3 = Education
- X4 = The total of family burdens

Determining the ecosystem management model for each type of coast people livelihood by the SWOT analysis approach.

3. Result and Discussion

3.1. The Respondent Role of Coast People Toward Mangrove Ecosystem Management

The coast people role of Probolinggo Regency in mangrove ecosystem management is measured by using 5 indicators, they are: first, what is done if knowing mangrove is helping; second, do you ever plant if there is broken mangrove plant; third, do you ever make mangrove seeding; fourth, do you care the seeds that have been planted; fifth, do you plant the successor if having cut the mangrove that has been old. Form the interview result, it can be concluded that the care or role of coast people respondents of Probolinggo Regency in mangrove ecosystem management is quite high.

3.2. The Mangrove Ecosystem Management Model of Probolinggo Regency Coast

For determining the model alternatives of mangrove ecosystem management of Probolinggo Regency coast, it is used the analysis adopted from the analysis model of SWOT. The SWOT analysis is done beginning by doing the analysis of internal or external strategic factors of Strategic Factor Analysis Summary (IFAS), and the analysis of internal or external strategic factors of Strategic Analysis Summary (EFAS).

The analysis results of internal factor score calculation (IFAS) and external factor score calculation (EFAS) have been plotted to axis cross, so the strategy alternative of mangrove ecosystem management based on the potencies of internal factors and external factors can be seen in the following picture.

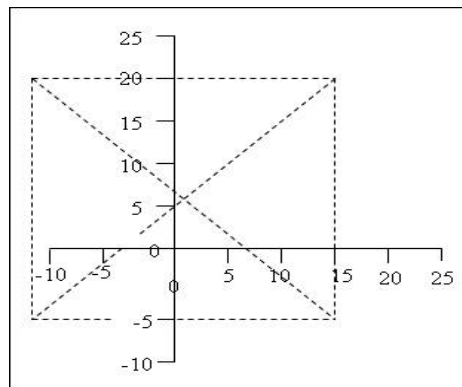


Figure- 1. The Score Picture of Internal and External Factors

From the results of picture section above, it can be known that the location of diagonal line intersection from internal factors and external factors is located in quadrant I, it means that the strategy alternative which can be suggested for doing is Aggressive Strategy. This strategy can be done by the way of maximizing strength factors and available chance factors.

3.3 The Factors That Influence Toward The People Role Rate

For answering about the role of coast people in supporting beach mangrove ecosystem management, so it needs to seek the relation between the influences of income rate, the types of jobs, and education toward how big the people role can be seen in table below this.

Table- 1. The Double Linear Regression Analysis Results of Factors that Influence People Participation Rate Toward Mangrove Forest Preservation in Probolinggo Regency

Number	Free Changers	Regression Coefficients	Error Standards	Significances
1.	Constant	7.944	1.706	0.000
2.	Income	4.320E-06	0.000	0.000
3.	Job	0.599	0.756	0.461
4.	Education	0.356	0.282	0.210
5.	The Total Family Burden	-0.285	0.427	0.507
Un free Changer: People Participation in Mangrove Forest Preservation				
$R^2 = 0.668$				
F hit = 42.779				
$\alpha = 0.05$				

a. Determination Coefficient (R^2)

In this research, the un free changer is people participation in supporting mangrove ecosystem management of Probolinggo Regency, whereas the free changers are income, job, education and the total family burden. The determinant coefficient of $R^2 = 0.668$ means that the total variations from people participation toward mangrove ecosystem management as 66.8 % determined by the variations from income, education, the total family burden, whereas 23.2 % is determined by another changer, besides the 4th independent variable above.

b. Over All Test (Test F)

In this research, F calculation is 42.779 and significant in $\alpha = 0.05$. This case means that the changers of income, job and the total family burden simultaneously influence toward the role of coast people in supporting mangrove ecosystem management of Probolinggo Regency coast.

c. Partial Test (Test T)

Test t is used for explaining the influences of each free changers toward un free changer. From the statistical analysis is gained the results as follows:

- i. The income changer influences toward people role changer. The regression analysis result is gained that the influence of significant and positive income changer in the rate of $\alpha = 0.05$ means that higher the people income, so higher the people role toward the mangrove ecosystem management support of Probolinggo Regency.
- ii. The changer influences of job, education and the total family burden really do not have significant influences toward the role of coast people in supporting mangrove ecosystem management.
- iii. The the results above, so it can be explained that in the research area, the society figures (socio-culture) are very important in mangrove forest preservation. Anyway, the people in the research area are very strong in economical ones seen from embankment filed mastery by several quite broad society figures. So, this case supports the analysis results that the income influences positively toward the role of coast people in supporting mangrove ecosystem management.

4. Conclusion

Several cases that need to conclude from the research results about the people role in supporting mangrove ecosystem management are as follows:

- a. The most respondent ages of coast people of Gending, Pajarakan, dan Kraksaan districts, Probolinggo Regency are between 30 to 59 years old, i.e. as 86 people or 95.55% indicates that coast people are productive ages so they can be hoped very potential for having role in supporting mangrove ecosystem management of Probolinggo Regency coast.
- b. The average respondent educational rates are mostly Elementary School to Senior High School, i.e. as 76 people. Generally, human resources of coast people have relatively good education level. Thereby, it can be hoped to have positive potencies for the role of coast people themselves toward the mangrove ecosystem management support of Probolinggo Regency coast.
- c. The average most respondents have family burdens two and three people as six people or 6.67 percent. But, there are still three respondents who have not have family burdens. Generally, more and more members help in respondent's jobs.
- d. The mangrove ecosystem management strategy of Probolinggo Regency coast is by involving people role (people and people figures) and governmental supports through the models of mangrove forest management strategy, the model of embankment cultivation management by entering mangrove as input resources of production facilities, and ecotourism management by the purpose of improving people income.

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